

Date: September 22, 2009

Title: Direct Variation

Objective: Relate proportions to equations.

IN: Mr. Biller has officially become the resident math dork that we all know, love, and especially pick on. He is the butt of 98% of all jokes in the math department! (Shhh...don't tell!) If the math department makes fun of him 686 times a day, how many total times do they make fun of each other each day?



Investigation



Step 1

Paste the table with ship canal data into your interactive notebook

Step 2

Using your engineering paper, carefully draw and scale a pair of coordinate axes for the data in the table. Let x represent the length in miles and y represent the length in kilometers. Plot points for the first eight coordinate pairs.

Step 3

What pattern or shape do you see in your graph? Connect the points to illustrate this pattern. Explain how you could use your graph to approximate the length in kilometers of the Suez Canal and the length in miles of the Trollhatte Canal.

Step 4

Enter your the length (in miles) in L1 and the length (in kilometers) in L2 of your calculator.

Step 5

Use list L3 to calculate the ratio $L2/L1$. Explain what the values in list L3 represent. If you round each value in list L3 to the nearest tenth, what do you get?

Step 6

Use the rounded value you got in step 4 to find the length in kilometers of the Suez Canal. Could you use your result to find the length in miles of the Trollhatte Canal?

The number of kilometers is the same in every mile, so the value you found is called a *constant*.

Step 7

How can you change x miles to y kilometers? Using variables, write an equation to show how miles and kilometers are related.

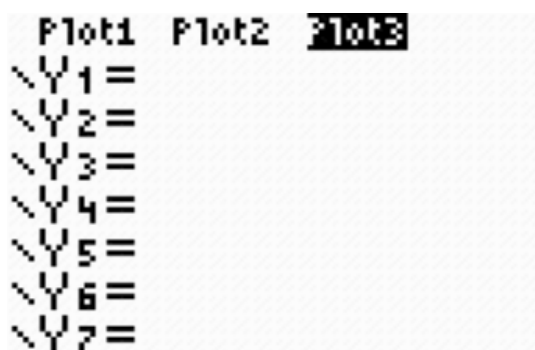
Step 8

Use the equation you wrote in Step 7 to find the length in kilometers of the Suez Canal and the length in miles of the Trollhatte Canal. How is using this equation like using a rate?

Step 9

It's time to graph your results on your graphing calculator! :0)

a) Hit the $Y=$ button on the top of your calculator.



```
Plot1 Plot2 Plot3
Y1=
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

b) Hit the 2nd button and then the Y= button (to get to "STAT PLOT")



c) Arrow down so that the blinking light is over the word On.



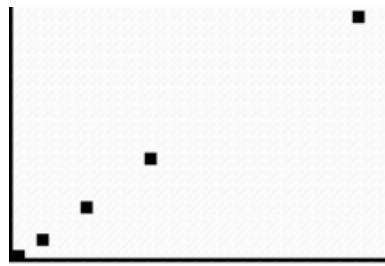
d) Make sure that the first graph is highlighted like the picture below.



e) Hit window and make the numbers look like the following:

```
WINDOW
Xmin=50
Xmax=200
Xscl=1
Ymin=80
Ymax=310
Yscl=1
Xres=1
```

f) Now hit the graph button and you will see a graph of your data like the following:

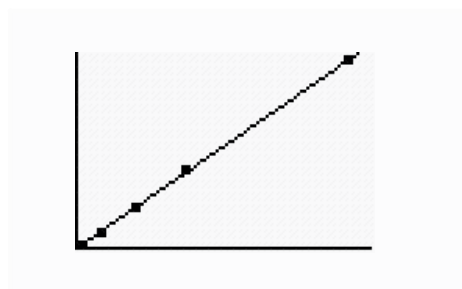


g) Take a moment to come up with an equation for this graph that fits the $y=mx+b$ form.

What did you come up with?

$$y=1.6x$$

h) Hit the $Y=$ button on the top of your calculator and enter your equation ($1.6x$). What do you notice?



Step 10

Hit the trace button and you can now hit the left or right arrow to see the coordinate pairs (x and y-values for each point on the graph).

Step 11

You can find missing information now that you have entered your equation. Hit 2nd Table. You should see the following:

X	Y1	
0	0	
1	1.6	
2	3.2	
3	4.8	
4	6.4	
5	8	
6	9.6	

X=0

X	Y1	
-2	-3.2	
-1	-1.6	
0	0	
1	1.6	
2	3.2	
3	4.8	
4	6.4	

Y1=1.6X

If you scroll up to highlight Y1, you will be able to see the equation you entered.

You can scroll down the table to find missing information. If the list skips over what you're looking for, you can make the list give more detail by hitting 2nd Window (to get to TBLSET).

TABLE SETUP
TblStart=53.8
 Δ Tbl=1
Indent: Auto Ask
Depend: Auto Ask

TABLE SETUP
TblStart=53.8
 Δ Tbl=0.1
Indent: Auto Ask
Depend: Auto Ask

Hit a smaller number by Tbl=. Whatever number you enter, that's what the table will count up or down by. Hit 0.1 and enter.

Now hit 2nd Graph to get to the Table again.
Notice that the numbers are more detailed.
You can now scroll down or up to the missing information you need.

X	Y1	
53.8	86.08	
53.9	86.24	
54	86.4	
54.1	86.56	
54.2	86.72	
54.3	86.88	
54.4	87.04	

X=53.8

Step 12

After using a graph, finding an equation, and using a table with your calculator, which method do you prefer? Why is that?

Out: If 4 packs of soda cost \$6.00, how much will 1 pack cost?
Put this information into a proportion and solve.

Homework:
Page 117
#1 through 4

Summary: Write the steps it takes to put an equation your graphing calculator and look at the table for missing information.